UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/690,507	10/23/2003	Ji Yong Park	1514.1032	6043

49455 7590 06/12/2008

STEIN, MCEWEN & BUI, LLP
1400 EYE STREET, NW
SUITE 300
WASHINGTON, DC 20005

EXAMINER	
SONG, MATTHEW J	
ART UNIT	PAPER NUMBER
1792	

MAIL DATE	DELIVERY MODE
06/12/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/690,507	PARK ET AL.	
	Examiner	Art Unit	
	MATTHEW J. SONG	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 March 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3,6-8,10,13 and 14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3,6-8,10,13 and 14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *4/28/2008*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3/26/2008 has been entered.

Information Disclosure Statement

2. The information disclosure statement filed 4/28/2008 fails to comply with the provisions of 37 CFR 1.97, 1.98 and MPEP § 609 because the AM reference is not in English and there is no translation. It has been placed in the application file, but the information referred to therein has not been considered as to the merits. Applicant is advised that the date of any re-submission of any item of information contained in this information disclosure statement or the submission of any missing element(s) will be the date of submission for purposes of determining compliance with the requirements based on the time of filing the statement, including all certification requirements for statements under 37 CFR 1.97(e). See MPEP § 609.05(a).

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1, 3 and 13-14 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Jung (US 6,825,493).

Jung discloses a method of forming an amorphous silicon layer on a substrate and crystallizing the amorphous layer to form polycrystalline silicon (col 14, ln 35-67). Jung also discloses the crystallization method comprises irradiating the amorphous silicon layer **200** with a laser beam **34** that passes through a mask **130** (col 9, ln 1-67 and Fig 6a). The mask is then moved along the lateral grain growth of the grains by a distances of about 0.7 micrometers; therefore each of the light transmitting portions of the mask exposes a portion of the first grain region, middle section, the second grain regain and an new amorphous silicon regions are additionally exposed resulting in larger grains (col 9, ln 45-67), this reads on applicant's the laser beam is overlappingly irradiated at an overlapping region on the substrate where amorphous silicon and a part of the already crystallized polysilicon are exposed so as to increase an average width of the polycrystalline silicon grains. Jung also teaches the width of the overlap corresponds to movement of the mask, which is varied between 0.7 micrometers and 1.7 micrometers (col 9, ln 45-67; col 10, ln 25-45; and col 14, ln 1-25). Jung teaches silicon grains have a width of 12 micrometers (col 10, ln 1-15) and have a grain width of 1.7 micrometers when the overlap is decreased (col 10, ln 1-65).

Referring to the limitation, "wherein the average width of the polycrystalline silicon grains is varied between approximately 0.2 and 0.6 μm and is decreased when the width of the

overlapping region on which the laser beam is overlapping irradiated is decreased", Jung teaches the width of the overlap corresponds to movement of the mask, which is varied between 0.7 micrometers and 1.7 micrometers (col 9, ln 45-67; col 10, ln 25-45; and col 14, ln 1-25). Also, the width of the grains is also between 0.2 and 0.6 μm based Fig 3C which shows the grains and has a 0.7 μm reference scale and the width between the grains. Furthermore, Jung teaches decreasing the width of the overlap, thus the average width of the grains will decrease because applicant's teach decreasing the width by decreasing the overlap, note paragraph [0028] of the original specification; therefore a similar grain width is inherent because Jung discloses an overlap within the range taught by applicant to obtain the claimed grain width. While Jung does disclose a grain width within the claimed range in Fig 3C, Jung does not state in the specification what the width is but rather the width can be determined from the figure. In the alternative that Jung does not teach the claimed width, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Jung by varying the overlap to obtain the claimed width.

Referring to claim 3, Jung teaches sequential lateral solidification crystallization (Abstract).

Referring to claim 13-14, Jung discloses irradiating an amorphous silicon film using a laser beam through a mask with a light transmission region and a light non-transmission region; transversely moving the mask; overlappingly irradiating the already formed crystalline silicon and has a width of 0.7 μm to 1.7 μm (col 9, ln 1 to col 10, ln 65).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 6-8 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jung (US 6,825,493) as applied to claims 1, 3 and 13-14 above, and further in view of Yang (US 2002/0197759 A1).

Jung discloses all of the limitations of claim 6, as discussed previously, except Jung does not teach the laser transmission region is wider than the laser non-transmission region by more than 1 μm.

In a method of sequential laser solidification (SLS) for crystallization of amorphous silicon, note entire reference, Yang teaches the mask moves transversely by no more than the wide of the shaped patterns as a laser performs SLS crystallization. (Abstract). Yang also teaches a mask includes a plurality of slits A that pass a laser beam and a light absorptive areas B that

absorb the laser beam and the wide of each slit A defines the grain size of the crystallized silicon ([0010]). Yang also teaches using a pattern of 2 μm ([0072]) and grains of 1-1.5 μm ([0076]). Yang also teaches an overlapped regions ([0040]). Yang also teaches more rapid crystallization can be achieved using masks having different slit patterns and laser beam scanning ([0035]). Yang also teaches a pattern where the slit patterns are wider than an interval "O". (Fig 6 and [0035]).

Yang teaches using different patterns and a pattern where the laser transmission region is larger than a non-transmission regions. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Jung by having a transmission region that is wider than a non-transmission region by more an 1 μm by optimizing the mask size because the size of the slit is a result effective and different patterns are used to achieve more rapid crystallization, as taught by Yang.

Referring to claim 7, the combination of Jung and Yang teaches stripes ('493 Fig 5 and '759 Fig 6).

Referring to claims 8 and 10, the limitations are the same as claims 1-3 which was discussed previously.

Response to Amendment

7. The declaration under 37 CFR 1.132 filed 3/28/2008 is insufficient to overcome the rejection of claims 1, 3, 6-8, 10 and 13-14 based upon 35 U.S.C. 102/103 rejection based on Jung (US 6,825,493) as set forth in the last Office action because: The declaration fails to show unexpected results because the declaration fails to compare the closest prior art, Jung, with the

claimed invention. The Declaration merely alleges that the invention produces unexpected results. Jung discloses a 2 μm mask and translating the mask by 0.7 μm (Fig 3C and col 3, ln 45-65), thus discloses an overlap of 1.3 μm which is within the range taught by applicant and applicant teaches when the overlap is between 0.5 and 2 μm, grain widths with in the claimed range are produced (See applicant's claim 1); therefore since Jung discloses the same method, Jung inherently discloses widths within the claimed range. The declaration does not compare this teaching of Jung, which is the closest prior art, to show unexpected results. Also, when the declaration discusses the Jung reference, emphasis is placed on the width of the grains disclosed by Jung, however the width of the grains is not the same as the width claimed by applicant. Applicant teaches the width is the horizontal distance between the triangular shaped grains, See Figure 1B. However, Jung teaches the "width" **S** to the vertical length rather than the distance between the triangular portions, See Figure 9E. Comparing applicant's Figure 1B and Jung's Figure 9E, the definition of width is not the same. Thus when Jung discusses "width" being 12 μm, that is not a teaching of "width" outside the claimed range. As to the declarations discussion of Fig 3C, the widths are disclosed in the Figure by comparison of the scale which illustrates the width of the grains is less than scale of 0.7 μm. The declaration merely restates the teachings of column 10 which discloses a width of 12 μm, however the width disclosed by Jung is not the same width as defined by applicant, as discussed previously.

Response to Arguments

8. Applicant's arguments filed 3/26/2008 have been fully considered but they are not persuasive. The declaration is not persuasive and the arguments are based entirely upon the declaration which was discussed previously.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to MATTHEW J. SONG whose telephone number is (571)272-1468. The examiner can normally be reached on M-F 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Kornakov can be reached on 571-272-1303. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Matthew J Song
Examiner
Art Unit 1792

MJS

June 9, 2008

/Robert M Kunemund/
Primary Examiner, Art Unit 1792